Review of the Muricid Genus *Acanthotrophon*

(Mollusca : Gastropoda)

BY

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(2 Plates)

Since my study of the muricid genus *Attiliosa* in the western Atlantic (Vokes, 1976) new information has caused a major shift in the position of certain of the forms originally assigned to that genus. Prior to the *Attiliosa* paper there were two superficially similar species in the Florida area that were confused under the name "*Coralliophila*" *philippiana* Dall, 1889. In that paper it was shown that the two were not the same and they were separated as *Attiliosa phillipiana* (Dall) and *Attiliosa striata* (Gabb). The latter takes its name from a species described as "*Muricidea*" *striata* by Gabb (1873) from beds of unknown age in the Dominican Republic.

Subsequent collecting in the Dominican area has provided numerous examples of "*Muricidea*" *striata* and it can be seen that this name was incorrectly applied to the second species. The type of "*M.*" *striata* is now known to come from the early Pliocene Gurabo Formation. All specimens are small, the largest seen measuring but 13.4 mm in height. It is less elongate than the "*philippiana*" form, which occurs in beds of Pliocene and Pleistocene age as well as in the Recent fauna of the Florida area. Most importantly, the protoconchs of the two are different.

The illustrations of the various examples referred to *Attiliosa striata* by Vokes prompted a paper by Radwin & D'Attilio (1978) in which they not only agreed that the two supposed forms of "*philippiana*" were distinct species, but suggested that they represent two different genera—*philippiana* being referred to *Attiliosa,* and *striata* to *Acanthotrophon*—and moreover, the two genera should be referred to two different subfamilies—*Attiliosa* to Muricinae and *Acanthotrophon* to Muricopsinae. The basis for this change of subfamily was the nature of the radula. At first consideration, I was reluctant to accept such a change on a radular basis alone. However, upon reflection, I realized that one of the major attributes of the subfamily Muricopsinae is the extreme variability of shell form, in contrast to the conservative nature of the Muricinae. This was further demonstrated by the timely discovery of sev-

Explanation of Figures 1 to 9

Acanthotrophon striatus (Gabb)

Figure 1: Holotype; ANSP 3249; height 12.3 mm; diameter 7.0 mm. Gurabo Formation, Dominican Republic ×4

Figure 2: USNM 298655; height 4.1 mm; diameter 2.7 mm. Locality: TU 1227A. Gurabo Formation, Dominican Republic ×10

Acanthotrophon striatoides Vokes, spec. nov.

Figure 3: Holotype, USNM 298656; height 21.3 mm; diameter 14.0 mm. Locality: TU 1240. Moín Formation, Costa Rica ×3

Figure 4: Paratype A, USNM 240682; height 26.4 mm; diameter 15.7 mm. Locality: TU 726. Caloosahatchee Formation, Florida ×2

Figure 5: Paratype B, USNM 240685; height 30.7 mm; diameter 17.3 mm. Locality: TU 759. Bermont Formation, Florida ×2

Figure 6: Paratype C, AMNH 182709; height 23.6 mm; diameter 12.5 mm. Locality: Off Sanibel Island, Florida; 55 m. ×2

Figure 7: Paratype D, AMNH 183199; height 24.8 mm; diameter 13.2 mm. Locality: Off Briar Reef, Florida ×2

Figure 8: Paratype E, USNM 298657; height 20.0 mm; diameter 12.8 mm. Locality: TU 1240. Moín Formation, Costa Rica ×10

Figure 9: Paratype F, USNM 298658; height 19.0 mm; diameter 12.9 mm. Locality: TU 1240. Moín Formation, Costa Rica ×3

Figure 1a

Figure 1b

Figure 3a

Figure 2

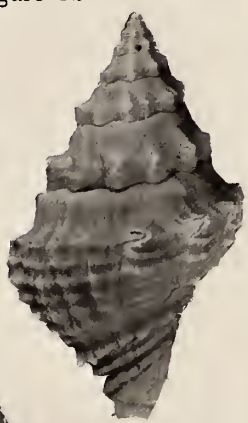

Figure 4

Figure 3b

Figure 5

Figure 6

Figure7

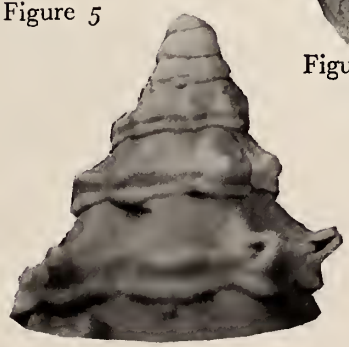

Figure 8

Figure 9a

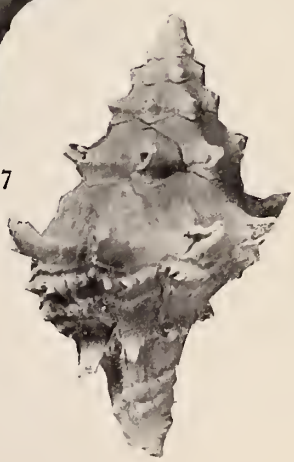

Figure 9b

eral well-preserved specimens of the now nameless species in the Pleistocene of Costa Rica, all of which show a marked scabrousness suggesting kinship with the Muricopsinae. One of these specimens was figured by Radwin & D'Attilio (1978: text fig. 2) as *Acanthotrophon striatus.* This specimen was included because it resembled so nearly the extremely scabrous *A. carduus* (Broderip), which can be accepted as muricopsine with no difficulty.

Thus we see that the genus *Attiliosa* in the western Atlantic is now confined to two species: *A. philippiana* and *A. aldridgei* (Nowell-Usticke, 1969). The type of the genus is *A. nodulosa* (Adams, 1855) from the eastern Pacific. So far as known, these are the only members of the group and, as Radwin and D'Attilio indicate, should be allocated to the subfamily Muricinae.

The genus *Acanthotrophon* in the western Atlantic now includes two species: *Acanthotrophon striatus* (Gabb) (Figures *1, 2*) and a second species named below as *A. striatoides* (Figures *3-9*). In the eastern Pacific there is a species-complex also referred to *Acanthotrophon,* including *A. sorenseni* (Hertlein and Strong, 1951), type of the genus, *A. carduus* (Broderip, 1833), and *A. sentus* Berry, 1969. In the Radwin and D'Attilio paper, in the guise of Editor, I commented (Vokes *in* Radwin & D'Attilio, 1978: 134) upon the similarities of the Pacific and the Atlantic members of this complex and added: "They probably all should be referred to the same species for which *Acanthotrophon carduus* (Broderip) would be the oldest name." This statement brought forth a number of Pacific specimens from Carol Skoglund and from Leroy Poorman, which were augmented by a loan of even more specimens from James McLean, at the Los Angeles County Museum. With this wealth of material available it is now possible to make the following observations upon the species in question.

The first named of the group is *Acanthotrophon carduus* (Broderip, 1833). It is also the most widely distributed. The type came from Peru (Figure *10*—a specimen essentially identical to the type) and the species ranges as far north as Mazatlán, Mexico. Specimens from the southern Mexican Coast (Figure *11*) are very like the typical form, but in the Gulf of California, where the range of *A. carduus* overlaps that of *A. sorenseni,* we see a peculiar variant (Figure *17*). The shell is more elongate, especially the siphonal canal, and the spines are reduced. The elongate canal, in particular, gives it a resemblance to *A. sorenseni* and some specimens (Figure *18*) begin to look not unlike *A. sentus.* But the inflated body whorl, the anal notch, the large umbilicus, the strong apertural lirations, and the color are all closer to *A. carduus.* Are these specimens yet another species? Or are they just extreme variants of *A. carduus*? More material may give a better indication as to the correct placement of these odd specimens but for now they will be considered as "sp. nov."

Acanthotrophon carduus is the member of the species-complex that demonstrates the same sort of variability seen in the Atlantic cognate. It is the most elaborately ornamented of all (Figure *12*) and may be distinguished by the presence of strong lirations on the inner side of the outer lip and by a marked umbilicus. There is a pronounced anal notch that is indicated on each whorl as a series of strong loops on the subsutural ramp, a feature lacking in all other members of the genus. The protoconch is essentially the same as that of *A. sorenseni* (Figure *15*) but not quite as attenuated. Both species have three conical whorls, approximately 0.6 mm in diameter. The color of *A. carduus* tends to be white to light brown, with the spines somewhat darker; the aperture is always white.

Acanthotrophon sorenseni (Hertlein and Strong, 1951) type of the genus, is confined to the Gulf of California, north of Mazatlán. It has a more slender, less ornamented shell; only the shoulder spines are well-developed, but these are frequently long and up-turned (Figures *13, 14*). The lirations inside the outer lip are only weakly developed. The siphonal canal is almost straight and, as a result, the shell is non-umbilicate. The color of the shell is a medium brown and the aperture is a conspicuous lavender color. The operculum is darker brown than that of *A. carduus.*

Acanthotrophon sentus Berry, 1969, is ornamented by fewer spiral ribs, but the individual spines are longer. There are only the faintest of lirations within the aperture, if any at all. In the collections of the Los Angeles County Museum there are 5 specimens, all showing this same morphotype (Figure *16*). Most are from the Galápagos Islands but the form is not confined to this area, one unquestionable *A. sentus* was taken on Isla Clarion, in the Revillagigedo Islands, some 1000 km off the coast of Colima, Mexico, and a second was from Isla del Coco, about 500 km off Costa Rica. *Acanthotrophon sentus* is apparently the offshore form of the complex.

The specimen figured by Radwin & D'Attilio (1978: figs. 3, 3a) as *Acanthotrophus sentus,* from Sonora, Mexico, is actually *A. sorenseni,* my error in identification (again acting as Editor). The worn holotype of *A. sorenseni* does not indicate the true strength of the spiral ornamentation. For this reason, the holotype (CAS 9611) is here refigured (Figure *14*) for comparison with an unworn example (Figure *13*).

With this sort of intergrading of ornamentation one might easily conclude that the 3 Pacific species are synonymous. However, there does seem to be a good geo-

graphic basis for the separation of *A. sorenseni* as a valid northern species and *A. sentus* as an offshore form. (See Appendix I for distribution data.) Here is a situation of speciation in action, identical to that demonstrated by the *Hexaplex* (*Muricanthus*) *radix-ambiguus-nigritus* complex, which also occurs along the eastern Pacific coast from Peru to the Gulf of California.

The member of the group that is found in the western Atlantic from the middle Pliocene to the Recent, which I originally referred to *Acanthotrophon striatus,* is not that form and is here named as a new species. Although resembling the Pacific cognate, it may be distinguished by the protoconch, which is almost twice the diameter of that in the Pacific species. The shell differs from true *A. striatus* in being larger, more elongate, more elaborately ornamented and, in particular, in the nature of the protoconch. The Dominican species has a protoconch of only one and one-half bulbous whorls, approximately 0.7 mm in diameter (see Figure 2), which is large relative to the overall size of the shell. The younger species has a protoconch (Figure *8*) of two and-one-half whorls, in which the middle whorl is larger than the terminal one. It is approximately 1 mm in diameter, larger than any of the other species in the group, although the overall size of the shell is comparable—some Florida Plio-Pleistocene specimens are as large as 30 mm, most others average about 25 mm.

Four of the species may have small denticles at the anterior end of the columellar lip but the development of these varies. In *Acanthotrophon carduus* all of the larger shells have them, as do the larger specimens of *A. striatoides*. Likewise, in *A. striatus* the larger examples have them. But in *A. sorenseni*, of over 30 examples studied only 2 very large shells had extremely tiny denticles at the fold of the columellar wall into the canal. None of the examples of *A. sentus* available show any trace of these denticles.

The line of true *Attiliosa* almost certainly came from the early Miocene *Poirieria* (*Panamurex*) *mauryae* Vokes, 1970, as originally suggested (Vokes, 1976: 103). However, rather than *A. striatus* being the first known form, it is *Attiliosa aldridgei.* In the early Pliocene Gurabo Formation we have several specimens of the latter, so that my statement (1976: 102) that *Attiliosa* first occurs in the lower Pliocene Gurabo Formation is still correct, only the name of the species has changed. But the origin of the muricopsine genus *Acanthotrophon* is a total mystery. The shell form is most like that of the genus *Murexsul,* which is world-wide since the Eocene. But the exact stages of development from *Murexsul* to *Acanthotrophon* are unknown.

One would assume that *Acanthotrophon striatus* is the ancestor to the Recent species and that probably the line of descent goes through *A. striatoides* also, before the Pacific line branched off in the (?) lower Pliocene. This would explain the extreme similarity between the eastern Pacific and western Atlantic species. There is only one flaw in this reasoning. The development of protoconchs usually seen in the muricids is a move from the multi-whorled form to a lesser number. In this instance *A. striatus* has the one and one-half whorl protoconch and the younger species have more. So it may prove in time that *A. striatus* is an offshoot of a different lineage.

Explanation of Figures *10* to *18*

Acanthotrophon carduus (Broderip)

Figure *10*: AHF 210-34; height 22.9 mm; diameter 15.0 mm. Locality: Bahía de Santa Elena, Ecuador, 9 - 12 m ×1½

Figure *11*: Poorman Collection; height 22.9 mm; diameter 16.3 mm. Locality: off Punta Jualapan, Colima, Mexico; 30 m × 1½

Figure *12*: LACM 38-8; height 30.1 mm; diameter 20.9 mm. Locality: off Zihuatanejo, Guerrero, Mexico, 36 - 73 ×1½

Acanthotrophon sorenseni (Hertlein & Strong)

Figure *13*: Poorman Collection; height 27.9 mm; diameter 18.0 mm. Locality: Bahía de San Carlos, Guaymas, Sonora, Mexico; 100 m ×2

Figure *14*: Holotype, CAS 9611; height 32.2 mm; diameter 20.0 mm. Locality: Gorda Banks, off Cabo San Lucas, Baja California Sur, Mexico; 109 m × 1½

Figure *15*: Poorman Collection; height 16.0 mm; diameter 13.4 mm. Locality: Bahía de San Carlos, Guaymas, Sonora, Mexico; 100 m ×10

Acanthotrophon sentus Berry

Figure *16*: AHF 155-34; height 23.2 mm; diameter 16.0 mm. Locality: Tagus Cove, Albemarle Island, Galápagos Islands, 90 to 110 m ×2

Acanthotrophon ? spec. nov.

Figure *17*: Skoglund Collection; height 35.8 mm; diameter 19.5 mm. Locality: Danzante Channel, Puerto Escondido, Baja California Sur, Mexico; 45 - 60 m ×1½

Figure *18*: Skoglund Collection; height 38.0 mm; diameter 24.5 mm. Locality: off Guaymas, Sonora, Mexico; 45 m ×1½